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Polyphylla ichnusae new species from Sardinia with notes on Mediterranean *Polyphylla* (Col. Scarabaeidae Melolonthinae Melolonthini)

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Abstract. – *Polyphylla ichnusae* n. sp., a Sardinian endemic, was previously reported in Sardinia as *P. fullo* (Linnaeus, 1754). Distinctive male genitalia, bidentate protibiae and light-brown elytral integument indicate that *P. ichnusae* represents an autochthonous species, clearly distinct from Corsican and continental populations of *P. fullo*. This finding further supports the higher level of endemism in Sardinia compared with Corsica. The new species appears to be restricted to north-eastern Sardinia, from sea level to approximately 1,000 m, where it inhabits mixed *Pinus–Quercus* forests. In comparing the new species with other Mediterranean *Polyphylla*, we also confirm the previously supposed conspecificity of *P. algerana* Brenske, 1896 and *P. macrocera* Reitter, 1891 with *P. fullo* (Linnaeus, 1758). A catalogue and a male identification key to Mediterranean *Polyphylla* species are provided with illustrations of the habitus, parameres and key characters (69 photos).

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Introduction

Polyphylla Harris, 1841 is a well-known Holarctic genus of large Melolonthinae (Scarabaeidae) beetles (body length >15 mm), commonly referred to as “pine chafers” in parts of Europe and “ten-lined June beetles” in North America. European species are especially recognizable by their striking black-and-white marbled elytra and the males’ expanded, lamellate antennal clubs. *Polyphylla* species are conspicuous summer beetles occurring in sandy forests, coastal dunes, rangelands, and various xeric shrublands. The larvae are typical soil-dwelling white grubs that feed on roots of grasses, forbs, shrubs, and young trees. Harris established the genus *Polyphylla* to accommodate three species previously assigned to *Melolontha* Fabricius, 1775. *Melolontha variolosa* Hentz, 1830, was the first species transferred to *Polyphylla* and thus became the nominal basis for the genus, subsequently designated as its type species (Young, 1988).

Despite its long history of study, the taxonomy of *Polyphylla* remains complex and at times problematic. Many species exhibit substantial intraspecific variation in external morphology—especially in the density, structure, and pattern of the vestiture—necessitating examination of series of specimens and careful assessment of geographic variation.

The unexpected discovery of a new species of the subgenus *Polyphylla* in Sardinia initiated the present investigation, which was subsequently broadened to include other Mediterranean representatives of the subgenus *Polyphylla*, several of which appear to be geographically isolated.

This study presents an overview of the genus *Polyphylla* in the Nearctic and Palearctic regions, a review of the Mediterranean species of the subgenus *Polyphylla*, and the description of a new Sardinian endemic species, followed by discussion and conclusions.

Material and methods

The specimens studied herein are deposited:

DCPC - Davide Cillo Personal Collection, Cagliari, Italy;

GSPC - Guido Sabatinelli Personal Collection, Prévessin, France;

LIAB - Leibniz-Institut zur Analyse des Biodiversitätswandels, Museum Koenig, Bonn, Germany;

MHNG - Muséum d'histoire naturelle de Genève, Geneva, Switzerland;

MNHN - Muséum national d'Histoire naturelle, Paris, France;

USDA - Università degli Studi di Sassari, Entomological Collection, Department of Agriculture, Sassari, Italy.

A total of 437 specimens of *Polyphylla fullo* (Linnaeus, 1758) were examined (296 MNHN, 21 LIAB, 16 DCPC, 12 MHNG,

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9 USDA, 83 GSPC), originating from Italy, France, Hungary, Romania, Georgia, Dagestan, Greece, Switzerland, Germany, Belgium, Spain, Morocco, Algeria, and Tunisia, thus representing the general distribution range of this species. In addition, 83 specimens of Mediterranean *Polyphylla* species from MHNG, GSPC and MNHN were examined for comparative purposes.

Genitalia were dissected following rehydration of entire dry specimens using commercial window-cleaning fluid. Morphological measurements and imaging of the parameres were performed using a Leica M205-C stereomicroscope equipped with a Leica DFC425 camera; source images were processed with Zerene Stacker and subsequently adjusted and assembled into plates using Adobe Photoshop. Adult specimens were photographed using an Olympus TG-6 camera in focus-stacking mode. Labels bearing collecting data are separated by a double slash // between labels and by a single slash / to indicate line breaks within each label.

Taxonomic treatment

Diversity and distribution of *Polyphylla*. – The genus *Polyphylla* exhibits a Holarctic distribution (Fig. 33), with well-documented faunas in both the Nearctic and Palaearctic regions. According to Schoolmeesters (2025), the genus currently comprises 82 species across the Holarctic.

In the Nearctic Region, *Polyphylla* species occur from approximately 15° to 56° N latitude, ranging from Honduras—where two endemic species are recorded—to Quesnel, British Columbia, at the northern limit. Several species inhabit Mesoamerica (southern and central Mexico, Honduras, and Guatemala), whereas others are restricted to California (Young, 1988). Nearctic *Polyphylla* diversity increased from seven species recognized in the early 20th century to 28 valid species in Young's revision (1988), arranged, primarily on the basis of aedeagal morphology, into four species complexes: *decemlineata* (Say, 1824), *diffRACTA* Casey, 1892, *occidentalis* (Linnaeus, 1767) and *hammondi* LeConte, 1856. Subsequent work, including La Rue (1998, 2016), added further species, and recent molecular studies indicate the presence of additional cryptic lineages within several complexes. Coca-Abia (2000) establish the synonymy *Polyphylla* of with *Polylamina* Hardy, 1974, junior synonym. The Nearctic fauna is currently considered to comprise 42 species in the United States and 3 species endemic to Mexico, with highest richness west of the Mississippi River (Schoolmeesters, 2025). In North America, several species—most notably *P. decemlineata*—are regarded as agricultural pests (Lilly and Shorthouse, 1971; Young, 1988).

In the Palaearctic Region, *Polyphylla* species occur between approximately 6° and 55° N latitude. The southernmost recorded locality lies in the Oriental Indo-Malayan Region (Cameron Highlands, Malaysia), represented by *P. tonkinensis* de Wailly, 1945, whereas the northern limit is reached by *P. fullo* (Linnaeus, 1758) in Sweden. The taxonomy of Palaearctic *Polyphylla* has undergone extensive revision since Crotch (1873) first grouped the species under *Macronoxia* he established, later synonymized with *Polyphylla*. Subsequent contributions by Kraatz (1882), Brenske (1890), Reitter (1890, 1901), and Semenov (1900) gradually expanded the known diversity. Medvedev (1951) recognized eleven species, which he distributed among five subgenera (*Polyphylla* s.str., *Gynexophylla* Medvedev, 1951, *Mesopolyphylla* Medvedev, 1951, *Xerasiobia* Medvedev, 1951, *Centrasiobia* Semenov, 1902). De Wailly (1948, 1993, 1997a, 1997b, 1998, 2000, 2001) provided the most comprehensive treatment of

Palaearctic *Polyphylla*, recognizing 33 species arranged into seven subgenera, those already indicated by Medvedev (1951), plus *Granida* Motschulsky, 1861 and *Grannoxia* Brenske, 1890, characterized primarily by aedeagal morphology, antennal structure and dorsal surface vestiture. Since then, several additional species have been described from East and Southeast Asia, as well as the Mediterranean, including taxa from China, Japan, and Southeast Asia (Petrovitz, 1965; Li & Yang, 1997; Zidek, 2006; Kobayashi & Chou, 2008; Keith, 2010, Sehna & Bezděk, 2011; Miessen G., 2013; Hass & Reichenbach, 2014; Kobayashi & Fujioka, 2016). These contributions have brought the total to approximately 40 species and 20 subspecies of *Polyphylla*, with peak diversity concentrated in Central and Eastern Asia (Schoolmeesters, 2025).

Subgenus *Polyphylla* Harris. – The diagnosis of the subgenus *Polyphylla* Harris was revised and completed by de Wailly (1993). Members of the subgenus *Polyphylla* are characterized by elytra bearing marbled white scaling; in some individuals, the scales are dense and nearly uniform across the surface. The elytra exhibit spots or patches of setiform scales that may, in some specimens, form an almost continuous covering. The claws possess a basal tooth of equal development on both inner and outer claws. The male anterior tibiae bear one to three anterolateral teeth, whereas females consistently exhibit three. Female antennal clubs consist of five or six segments, while male clubs are large, curved, and exceed the length of the clypeal anterior margin. The third antennal segment is short and approximately equal in length to the pedicel. The male clypeus is subrectangular to weakly trapezoidal, with the upper angles slightly produced laterally. One to three external teeth may be present along the anterior margin; in three-toothed specimens, the median tooth is contiguous with the upper. The terminal maxillary palpomere is narrow, subequal in length to the penultimate segment, moderately elongate, and lacks an apical fossa. The clypeal disc is low and weakly trapezoidal, with the lower margin slightly shorter than the upper. The pronotum bears marbled bands or patches of scales, more rarely scattered spots; the anterior margin lacks cilia, whereas the lateral margins bear short cilia. The head is uniformly clothed with yellow scales and lacks setae. The abdomen is clothed with fine, appressed hairs or scales. Female posterior tibiae bear two oblique carinae.

Mediterranean *Polyphylla* s. str. – Within the Mediterranean region, nine species of *Polyphylla* are currently considered valid. The fauna is dominated by *Polyphylla fullo* (Linnaeus, 1758), which is widely distributed from the Atlantic coasts across southern and central Europe to western and central Asia, and by several regional or insular endemics occurring in North Africa, the Levant, and major Mediterranean islands.

The Mediterranean *Polyphylla* species include: *albertschulzi* Kuntzen, 1933 from Crete (Greece; Fig. 8, 17); *boryi* (Brullé, 1832) from Bulgaria, Croatia, Greece, and Montenegro, extending into Turkey (Fig. 7, 18); *fullo* (Linnaeus, 1758), widely distributed across much of southern and central Europe, including Albania, Austria, Belgium, Croatia, Czech Republic, France, Germany, Greece, Hungary, Italy, Luxembourg, the Netherlands, Poland, Romania, Spain, Switzerland, Turkey, and the United Kingdom (Fig. 11, 24-30); *hassi* Hass & Reichenbach, 2014, described from Rhodes (Greece) and subsequently observed from Samos Island and Kos (Greece, personal observations) (Fig. 12, 19); *maroccana* Peyerimhoff, 1925, represented by two subspecies, *maroccana maroccana* Peyerimhoff, 1925 from Morocco (Fig. 11, 13) and *maroccana descarpentriesi* De Wailly & Baraud, 1982 from Algeria (Fig.



Fig. 1-6. Habitus male.

1. *Polyphylla maroccana maroccana* Peyerimhoff, 1925. 2. *P. maroccana descarpentriesi* de Wailly & Baraud, 1982. 3. *P. turkmenoglui* Petrovitz, 1965 (Holotype). 4. *P. ragusae ragusae* Kraatz, 1882. 5. *P. ragusae aliquoi* Massa & Tassi in Baraud, 1977. 6. *P. naxiana* Reitter, 1902.

2, 14); *naxiana* Reitter, 1902 from Naxos (Greece; Fig. 6, 21); *olivieri* (Laporte, 1840), occurring in parts of the eastern Mediterranean and western Asia, including Abkhazia, Armenia, Greece, Syria, and Turkey (Fig. 9, 22); *turkmenoglui* Petrovitz, 1965 from western Turkey (Fig. 3, 20); and *ragusae* Kraatz, 1882 from Sicily, represented by two subspecies, *ragusae ragusae* (Fig. 4, 16) and *ragusae aliquoi* Massa & Tassi, in Baraud, 1977; Massa, 1980 (Fig. 5, 15).

Several names from historical literature were considered as synonyms within the Mediterranean fauna: *Polyphylla lesinae* Reitter, 1890, *luctuosa* Mulsant, 1842, *marmorata* Mulsant, 1842, *abchastica* Motschulsky, 1845, and *caucasica* Heyden, 1864 (see Catalogue).

General biology of Mediterranean *Polyphylla*. – The primary habitats of Mediterranean *Polyphylla* species are coastal and inland dune systems dominated by *Pinus pinea*, *P. pinaster*, *P. halepensis*, juniper scrub, *Ammophila* stands, and other psammophilous vegetation. Populations also occur on sandy river terraces, alluvial fans, and in pine plantations established on former dune substrates. In the Iberian Peninsula and the western Mediterranean, the group shows a strong association with maritime and stone pine on coastal dunes, and adults are frequently attracted to artificial lights in tourist resorts. In the Maghreb, species occupy coastal and inland sandy habitats linked to pine–dune ecosystems, whereas in the Adriatic, Aegean, and Anatolian regions they inhabit dune fields, pine woodlands, and the margins of sandy steppe environments. Development typically spans 2–3 years (occasionally 4), depending on soil temperature and nutrient availability. Oviposition takes place in mid to late summer in loose, sparsely vegetated sandy soils near host plant roots. Larval development comprises three instars, during which larvae overwinter below the frost line or descend deeper into the soil during drought; their vertical movements closely track seasonal changes in moisture and temperature. Pupation occurs in earthen cells from late spring to early summer, and adult flight activity is predominantly crepuscular to nocturnal. Adult males fly more extensively than females and are strongly overrepresented at light sources. In North Africa and low-elevation coastal regions, flight phenology peaks in May–June; in the western and central Mediterranean, activity is concentrated in June–July; and in the eastern Mediterranean and at higher elevations, peak flight shifts later, typically to July–August. Larvae feed on the roots of dune grasses (*Ammophila*, *Elymus*), forbs, shrubs (including *Juniperus*), and conifer seedlings. In managed environments, they may damage turf, ornamentals, nursery stock, vineyards, and young orchards. Adult feeding is limited in many species, though some individuals consume pine needles, shrub foliage, or tender shoots; overall, adult damage is minor compared with larval root pruning. Adults are crepuscular to nocturnal and show a strong attraction to artificial lights. Mate location is primarily mediated by volatile sex pheromones, which males detect using their enlarged antennal lamellae. Adults can stridulate and may feign death when disturbed, and their robust legs allow rapid burrowing. Local abundance is strongly influenced by soil texture, moisture, temperature, host-plant distribution, and disturbance regimes. Sandy, sparsely vegetated habitats with stable perennial hosts tend to support the highest densities. Larvae exhibit seasonal vertical migration, and adults may emerge synchronously following warm periods or precipitation (Paulian, 1959).

Along the Atlantic coasts, *Polyphylla fullo* occurs in mobile dunes dominated by *Ammophila arenaria*, where the larvae

feed extensively on the rhizomes of marram grass in the white dune.

Mediterranean *Polyphylla*—particularly dune-restricted and insular populations—face multiple threats, including dune stabilization, afforestation, urbanization, tourist development, soil compaction, and light pollution. *P. fullo* (Linnaeus, 1758) exemplifies the dual conservation–pest dynamic of the group: regionally declining in natural dune systems yet locally abundant and occasionally damaging in managed landscapes.

***Polyphylla fullo* (Linnaeus, 1758) distribution and biology.** – *Polyphylla fullo* is widespread in the Western and Central Palaearctic. Its range includes most of southern and central Europe, being recorded from Albania, Armenia, Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Belarus, Switzerland, the Czech Republic, Germany, Denmark, Spain, France, the United Kingdom, Greece, Croatia, Hungary, Italy, Lithuania, Luxembourg, Monaco, Moldova, Montenegro, the Netherlands, Poland, Romania, Serbia, Sweden, Slovenia, and Slovakia. The species is also present in parts of the Eastern Mediterranean and Near East, including Syria, Turkey, and Ukraine, and extends further eastwards into Transcaucasia and western Turkey where it meets *Polyphylla olivieri* (Laporte, 1840).

Across this extensive region, *P. fullo* typically occupies sandy habitats, coastal dune systems, and open pine woodlands. In Italy, it occurs primarily in the Po Valley, including Piedmont, Emilia, Lombardy, and Tuscany; additional records are known from Lazio and from the province of Trieste, with the range extending northward to the Swiss border near Bellinzona. In North Africa the species is present in isolated localities along the coastal belt and in montane refugia dominated by *Cedrus* forests: documented in Tunisia from Le Kef; Souk el Arba, Cap Serrat, Sousse, Tebourouk, Enfidha, Holeven, south of Monastir, Chaouat, Béja, Medjez, and Bab; in Algeria it is reported from Philippeville (loc. typ. of *algeriana* Brenske 1896), Bône, Bermandriz near Algiers, Edough, Saint Charles, and Yakouren, additional records occur near the Algerian–Moroccan border, particularly in the Aïn Sefra region; in Morocco it is widespread in montane habitats: In the Western High Atlas, southwest of Midelt, in the Forêt de Taffert (Otin, Sauvage), in the Eastern Middle Atlas, from south of Bata, Bab-bou Idir, and Tamtroucht, in the Central Middle Atlas, from Ifrane, Djebel Hebri (2000 m), and Djebel Ahmar; In Spanish Morocco (Rif Mountains), it is recorded from the Central Rif, including Isaguen (1500 m) and Cabo de Agua, primarily in coniferous habitats dominated by cedar forests (Baraud, 1985).

Distribution and biology in the Sardo–Corsican complex. – Specimens referred to *Polyphylla fullo* have been collected at several localities across Corsica, including Lento, Vallée de Mezziana, Quenza, Tarco, Porto-Vecchio, Lac de Nino, Evisa, Forêt de Valdo Niello, and Vizzavona, as well as in additional montane areas at a considerable distance from the coast (Jiroux et al. 2020). A series of specimens from Col de Bavella (Aléria–Sartène) is preserved in the MNHN. Further records based on published online observations originate from Propriano and Palombaggia and Moriani.

Although well documented from Corsica, the occurrence of the genus *Polyphylla* in Sardinia was not recognized by Pesarini (2004). Pisano et al. (2003) were the first to report *Polyphylla* from Sardinia, referring the specimens to *P. fullo*. Additional records were subsequently referred to the same species by Bazzato et al. (2013) based on material from the University of Sassari collection (USDA) and private holdings, and were tentatively attributed to passive introduction. The taxon was later included in faunistic updates of the Italian Scarabaeidae



Fig. 7-11. Habitus male.

7. *Polyphylla boryi* (Brullé, 1832). 8. *P. albertischulzi* Kuntzen, 1933. 9. *P. olivieri* (Laporte, 1840). 10. *P. ichnusae* Sabatinelli, Nuvoli & Cillo **n. sp.** (Holotype). 11. *P. fullo* (Linnaeus, 1758) (from Italy, Marche region).

(Ballerio et al., 2014; Rattu et al., 2020). Confirmed online records of *Polyphylla* from Sardinia include Su Tiriazu near Posada, 22.VIII.2013 (photographic record on Forum Natura Mediterraneo 2020), and Porto Pollo, at the mouth of the Liscia River, VII.2017 (one male observed but not collected; *vide* L. Fancello).

Examination of male genitalia and general morphology of specimens studied indicate that these Sardinian populations represent a distinct, autochthonous species, herein described as *Polyphylla ichnusae* n. sp.

Family **Scarabaeidae** Latreille, 1802

Tribe, **Melolonthini** Samouelle, 1819

Genus ***Polyphylla*** Harris, 1841

***Polyphylla ichnusae* n. sp.**

(Fig. 10, 23, 28, 55)

ZooBank : <https://zoobank.org/809084DC-84FE-408C-9D2C-8172003777DB>

Holotype, ♂, // SARDEGNA (P) / Monte Limbara (P) / 15.VIII.1967 (H) // (USDA).

Paratypes

2 ♂ // SARDEGNA (P) / [Monte] Limbara [Olbia Tempio province] (H) / 15.VII.1967 (H) // (USDA);

1 ♂ // SARDEGNA (P) / Monte Limbara (H) / 30.V.1967 (P) // (USDA);

1 ♂ // SARDEGNA (P) / Limbara (H) / VI.1963 (H) // (USDA);

1 ♂ // SARDEGNA (P) / Limbara (H) / 18.VII.1962 (H) // (USDA);

1 ♂ // SARDEGNA (P) / Limbara (H) / 13.VII.1955 (H) // (DCPC);

1 ♂ // SARDEGNA (P) / Tempio [Pausania] (Sassari) (P) / 15.VII.1966 (H) // *Polyphylla fullo* L. / J. 1992 det. (H) // (DCPC);

1 ♂ // Tempio (Sardegna) / Ig. Rattu (H) // (DCPC);

1 ♂ // SARDEGNA (P) / Tempio (H) / 12.VII.1962 (H) // (MHNG);

1 ♂ // SARDEGNA (P) / Tempio (H) / 22.VI.1963 (H) // (USDA).

Description of the holotype (Fig 10)

General morphology and coloration. – Body length 37.2 mm; maximum width 16.3 mm. Distinctly bicolored: head, pronotum, and abdomen black; elytra, antennae, mouthparts and legs reddish-brown. Dorsal surface with white, narrow scales forming a marbled pattern on the elytra; remaining dorsal areas glabrous.

Head. – Clypeus transverse, approximately three times as wide as long (width 4.1, length 1.3 mm), with broadly reflexed margins; anterior angles rounded. Anterior margin broadly truncate and weakly sinuate in dorsal view, concave in frontal view. Clypeal punctures slightly larger than those on the frons, separated by 0.5–1.0× their diameter. Interocular area with coarse, contiguous punctures; occipital region impunctate, smooth and shiny. Antennae 10-segmented, antennomer I: 1.4 mm length, II: 0.4 mm, III: 0.9 mm; club composed of seven flabellate antennomeres, length 3× width of clypeus, strongly curved outward, total length including curve parts 7.5 mm.

Pronotum. – 1.9× wider than long, lateral margins slightly angulate, rounded, and weakly serrate due to setigerous punctures. Surface shiny between punctures. Pronotal punctures coarse, 1.0–1.5× diameter of those on the clypeus, separated by more than 2× their diameter near the anterior and posterior angles, and more widely spaced on the disc (1–4× their diameter). Most punctures bear a scale. Hypomeron with scattered coarse, scale-bearing punctures, except for the apicolateral third near the pronotal angle, which is completely glabrous.

Scutellum. – With 3.2 mm, length 2.3 mm, with dense punctation bearing minute, coalescent scales; scales absent along midline.

Elytra. – Length 3.2× pronotal length. Lateral margin strongly reflexed, reaching the external lateral angle but not extending to the apex. Surface shiny, with glabrous basal areas and coarsely punctate regions on the apical two-thirds, interspersed with patches of fine,

dense punctures; all punctures bear scales. Scale patches vaguely marbled in arrangement. Hind wings present and fully functional (specimen observed in flight by collectors).

Legs. – Femora slightly flattened and narrow. Protibia distinctly bidentate, elongate and straight, with an apical tooth and a second tooth at the apical quarter. Mesotibia and metatibia slender throughout, parallel-sided for most of their length, not expanded apically, and lacking a median external tooth. Metatibial spurs narrowed to an acute point. All tarsal claws with an equal-sized basal tooth (Fig. 55).

Ventral side. – Metathorax densely clothed with long, erect golden setae. Each abdominal sternite with a band of punctures bearing very short, appressed white setae; band broad laterally and narrowed medially. Punctures on all visible sternites fine and dense.

Aedeagus. – Parameres 2.5× longer than basal width (dorsal view), narrowing toward apex; apex laterally flattened in lateral view dorsally angulated with dorsal carina short (Fig. 23, 28).

Female. – Unknown.

Etymology. – The species name *ichnusae* refers to an ancient Greek name for the island of Sardinia, derived from *ichnos* (ἵχνος), meaning “footprint” or “track,” in reference to the island’s footprint-like shape.

Variability. – Body length 34–35 mm; width 16–18 mm. Anterior clypeal margin usually weakly sinuate in frontal view; in some individuals slightly raised medially. Elytral scale patches variable in size; elytral ground ranging from reddish-brown to light brown.

Distribution. – Records are currently restricted to the northeastern part of Sardinia, Italy. On some specimen labels, “Sassari” is indicated as the administrative province of the collecting locality; this reflects the administrative division of Sardinia at the time of collection (1950s–1960s), when the island was divided into only three provinces: Cagliari, Sassari, and Nuoro. At present, the localities of Tempio Pausania and Monte Limbara fall within the more recently established province of Olbia–Tempio rather than Sassari.

Diagnosis and Relationships

Polyphylla ichnusae n. sp. is readily distinguishable from *P. fullo* (Linnaeus, 1758) by four principal morphological characters:

- (1) A bicoloured habitus, with head and pronotum black and the elytra light brown (Fig. 10);
- (2) The anterior tibiae with only two teeth on the apical external margin (Fig. 10);
- (3) The apex of the parameres in lateral view robust, with an almost angulate dorsal margin;
- (4) A short dorsal carina on the parameres (Fig. 23, 28).

In the European and North African populations of *Polyphylla fullo* examined, specimens may occasionally (ca. 20–30%) exhibit a light-brown integument (ab. *marmorata* Mulsant, 1842); however, in such cases the head and pronotum are concolorous with the elytra and the habitus is not bicoloured. In addition, the anterior tibiae are tridentate or at least bear an incipient basal tooth. In dorsal view, the apices of the parameres in all examined males of *P. fullo* are smoothly curved, and the dorsal carina is markedly longer than in *P. ichnusae* n. sp. (Fig. 24, 25c, 26c, 29c, 30c vs. 23).

Ecological notes & Remarks

The species is currently known only from north-eastern Sardinia, from sea level to ca. 1000 m, where it inhabits mixed Mediterranean forests dominated by *Pinus* spp. and *Quercus* spp. Adults are active diurnally and crepuscularly and show strong photoprism. Its apparent absence from central and

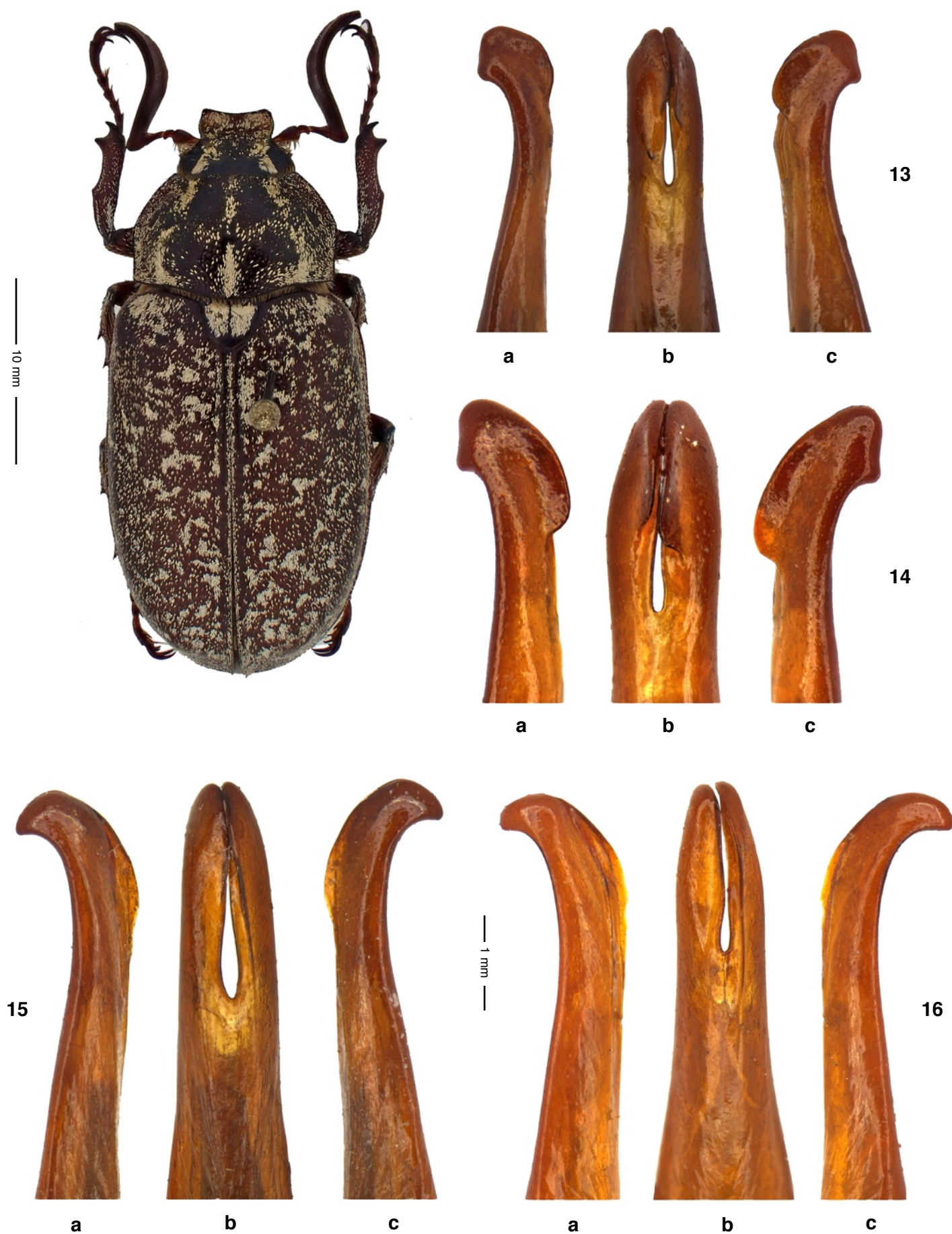


Fig. 12-16. Habitus male.

12. *Polyphylla hassi* Hass & Reichenbach, 2014. 13-16. Apex of paramera. a. Left view. b. Dorsal view. c. Right view. 13. *Polyphylla maroccana maroccana* Peyerimhoff, 1925. 14. *P. maroccana descarpentriesi* de Wailly & Baraud, 1982. 15. *P. ragusae aliquoi* Massa & Tassi, in Baraud 1977. 16. *P. ragusae ragusae* Kraatz, 1882.

southern Sardinia corresponds to the scarcity of suitable habitats in these regions and to extensive negative survey data. In Sardinia, *Pinus* trees are represented by very few native stands, contrasting with widespread non-native plantations. Native pine forests are mostly coastal, whereas the only known montane native site occurs in Gallura on Mt. Limbara—the locality where *Polyphylla* specimens were collected. The association of *P. ichnusae* n. sp. with native conifer forest supports the interpretation that the species is indigenous rather than introduced through forestry activities.

The discovery of *P. ichnusae* n. sp. parallels several recent findings of large but historically overlooked Melolonthinae in the western Mediterranean, including *Melolontha sardiniensis* Drumont et al., 1999, *Anoxia (Mesanoxia) hirta* Reitter, 1890, and *A. (Mesanoxia) noctuabunda* Leo, Garagnani & Sabatinelli, 2021. The apparent rarity of these species is likely attributable to localized distributions, narrow habitat preferences, and short or environmentally constrained adult activity periods. These findings underscore the need for intensified faunistic and ecological surveys in Sardinia and other Mediterranean islands, where microendemism is widespread and many Scarabaeoidea remain insufficiently sampled. Expanded spatial and temporal coverage will be necessary to refine species distributions, assess conservation status, and improve the taxonomic resolution of Mediterranean Melolonthini lineages. The distinctiveness and restricted distribution of *P. ichnusae* n. sp. contribute to the well-documented pattern of high Sardinian endemism relative to Corsica, also observed in *Pachypus* spp. (Eberle et al., 2019), which shows a distinct speciation pattern particularly in Sardinia.

Polyphylla exhibits a broad Euroasiatic-North African distribution, consistent with colonization of the Sardinian–Corsican block during Pleistocene glacial phases followed by isolation and subsequent speciation. This interpretation is further supported by the observation that several other pleurostict Scarabaeoidea genera likewise frequently exhibit species-level differentiation between populations occurring on the two islands as above mentioned.

We should note that species limits within *Polyphylla* genus remain incompletely resolved, and reliable identification often requires detailed study of the male genitalia, increasingly supplemented by DNA barcoding.

Remarks on some Mediterranean *Polyphylla*

Polyphylla fullo algerana Brenske, 1896, *P. fullo* (Linnaeus, 1758) **junior synonym**

Brenske (1896) described *Polyphylla algerana*, which would differ by “its narrower form, the abdomen densely covered with white scales, and the pygidium likewise scaled.” Type locality: Philippeville (now Skikda) and type specimen housed in the Vienna Museum. The taxon was reported also from Turg and Guartoufa. De Wailly (1997a) although listing this taxon as subspecies expressed serious doubts on its real value: “[translated from French] for convenience, we may retain this name, which corresponds to the geographical form of *P. fullo* in Algeria, although the characters mentioned as differential possess no real systematic value”. Actually when examining series of specimens from various localities, or even individuals collected within the same locality, morphological variability within this taxon is considerable. Based on the overlapping characters with *Polyphylla fullo*, we propose that it be treated as a junior synonym of *P. fullo*.

Polyphylla fullo macrocera Reitter, 1891, *P. fullo* (Linnaeus, 1758) **junior synonym**

In Spain and Morocco, *Polyphylla fullo* appears to be represented by very large, blackish individuals, some of the male specimens with antennal club exceptionally long and curved, seemingly referable to *macrocera* Reitter, 1891 (type locality: Cuenca, Spain). The spurs of the female hind tibiae are broader, spoon-shaped, and irregular in outline. The abdominal pubescence is fine and white instead of gray. The species has also been reported from central Italy (Porta, 1932; Ballerio et al., 2014). In reality, as in other North African species of Melolonthini, there is marked individual variability due to specific adaptation or difficult conditions for the development and constant diagnostic character exists to distinguish them a part paramera. As for the differential characters based on the shape of the abdominal scales, these cannot be regarded as reliable criteria. As noted by Kocher (1958) in his remarks, “the vestiture of the Melolonthinae represents a transient and often inconsistent character, certainly insufficient to justify a valid specific separation [translated from French]”. Baraud (1977) adds: “we believe that these are individual variations rather than a true subspecies [translated from French]”, therefore, we propose that it be treated as a junior synonym of *P. fullo*.

Polyphylla sicardi Bedel, 1917

De Wailly (1990) assigned this species to the subgenus *Xerasiobia* Medvedev. However, the general habitus and the shape of the apices of the parameres and geographical distribution, suggest a closer affinity to *Polyphylla maroccana* than to *P. adspersa*. Recently collected material from the type locality area has been assembled by Olivier Montreuil and Geoffrey Miessen, who are currently preparing a dedicated study on this species. We therefore refrain from proposing a revised systematic placement here and leave clarification of its taxonomic status to their forthcoming work.

Polyphylla hassi Hass & Reichenbach, 2014

This species, recently described from Rhodos, is morphologically very similar to *Polyphylla turkmenoglui* Petrovitz, 1965 from western Turkey. The authors compared the material with the type specimen of *P. turkmenoglui*, which exhibits a dense elytral vestiture of small white scales; however, other specimens of the type series show a much less dense white vestiture. Additional characters mentioned in the original description, such as differences in the shape of the clypeus, appear to be inconsistent when applied across the type series of *P. turkmenoglui*. *Polyphylla hassi* may therefore represent an insular form of *P. turkmenoglui*. We could confirm the presence of this taxon also in the Dodecanese islands of Samos and Kos.

P. naxiana Reitter, 1902

Although the habitus of this species resembles that of *P. ragusae* Kraatz, 1882, the parameres are more closely related to those of the *P. olivieri-fullo* informal species group.

Catalogue of Mediterranean *Polyphylla*

albertischulzi Kuntzen, 1933

Kriti (Greece)

boryi (Brullé, 1832, *Melolontha*)

Bulgaria, Croatia, Greece, Montenegro, Turkey.

lesinae Reitter, 1890, syn.

fullo (Linnaeus, 1758, *Scarabaeus*)

Albania, Algeria, Armenia, Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Belarus, Croatia, Central European Russia, Czech Republic, Germany, France, Great Britain, Georgia, Greece, Hungary, Italy, Kosovo,

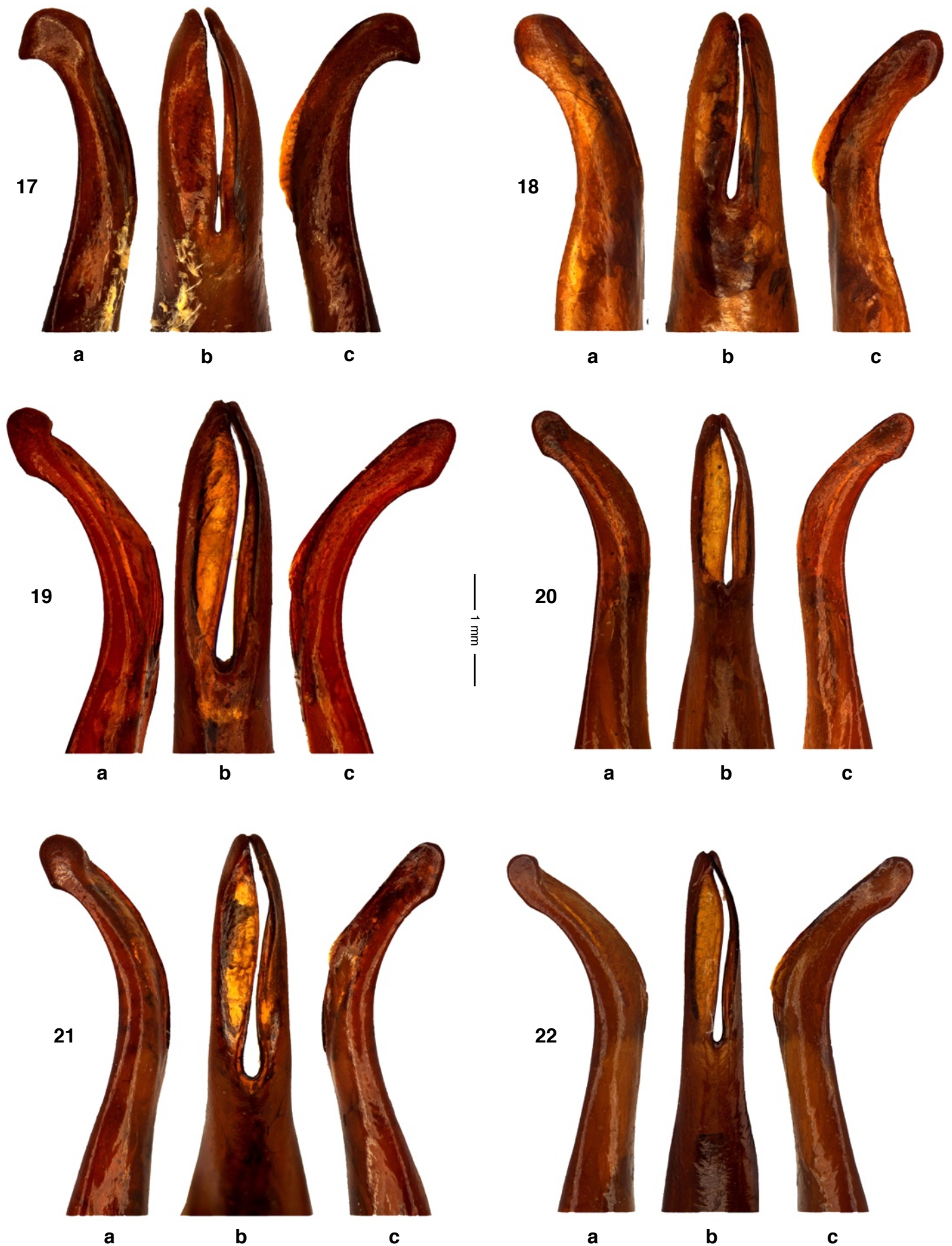


Fig. 17-22. Apex of paramera.

a. Left view. b. Dorsal view. c. Right view. 17. *Polyphylla albertschulzi* Kuntzen, 1933. 18. *P. boryi* (Brullé, 1832). 19. *Polyphylla hassi* Hass & Reichenbach, 2014. 20. *P. turkmenoglu* Petrovitz, 1965 (Holotype). 21. *P. naxiana* Reitter, 1902. 22. *P. olivieri* (Laporte, 1840).

Latvia, Lithuania, Luxembourg, Monaco, Moldova, Montenegro, Morocco, Netherlands, Poland, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Tunisia, Turkey.

algerana Brenske, 1896, n. syn.

macrocera Reitter, 1891, n. syn.

luctuosa (Mulsant, 1842, (*Melolontha*) syn.

marmorata (Mulsant, 1842, *Melolontha*) syn.

hassi Hass & Reichenbach, 2014

Rhodos, Samos and Kos Islands (Greece, Dodecanese)

ichnusae Sabatinelli, Nuoli & Cillo n. sp.

North East Sardinia (Italy).

maroccana maroccana Peyerimhoff, 1925

High Occidental Atlas, Sous Region, Al Haouz Province (Morocco)

maroccana descarpentriesi de Wailly & Baraud, 1982

Naâma Province (Algeria)

naxiana Reitter, 1902

Naxos (Greece).

olivieri (Laporte, 1840, *Melolontha*)

Abkhazia, Armenia, Georgia, Greece, Turkey, Iran, Israel, Turkmenistan, Syria, Russian South European Territories.

abchasica Motschulsky, 1845, syn.

caucasica Heyden, 1864, syn.

ragusae aliquoi Massa & Tassi, in Baraud 1977

South East Sicily (Italy).

ragusae ragusae Kraatz, 1882

North West and East Sicily (Italy).

sicardi Bedel, 1917

Boulemane Province (Morocco).

turkmenoglui Petrovitz, 1965

West Turkey.

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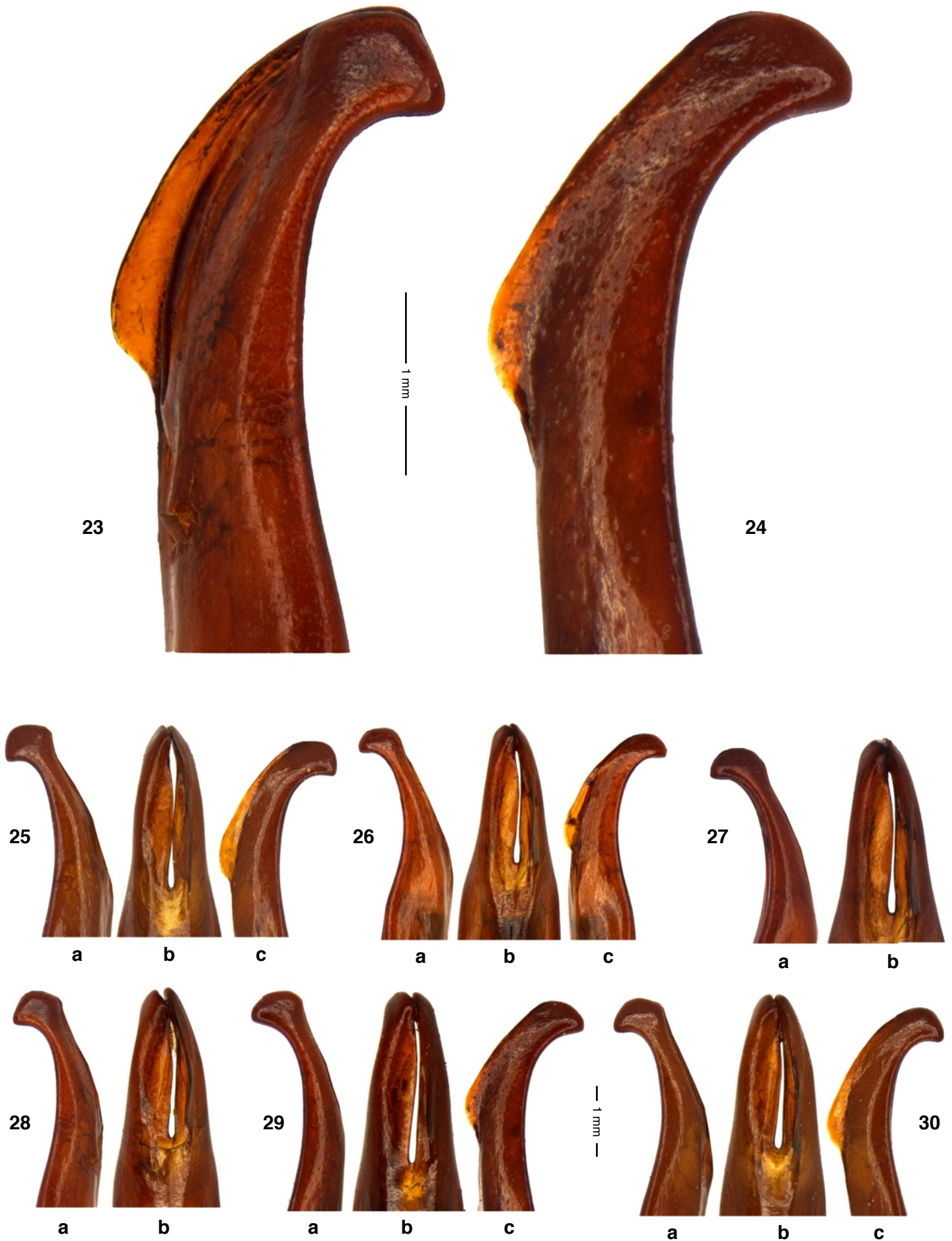


Fig. 23-30. Apex of paramera.

a. Left view. b. Dorsal view. c. Right view. 23. *Polyphylla ichnusae* Sabatinelli, Nuvoli & Cillo n. sp. (Holotype). 24. *P. fullo* (Linnaeus, 1758) (from Italy, Marche region). 25. *P. fullo* (from Morocco). 26. *P. fullo* (from Algeria). 27. *P. fullo* (from Italy, Marche region). 28. *P. ichnusae* Sabatinelli, Nuvoli & Cillo n. sp. (Holotype). 29. *P. fullo* (from Hungary). 30. *P. fullo* (from Corsica).

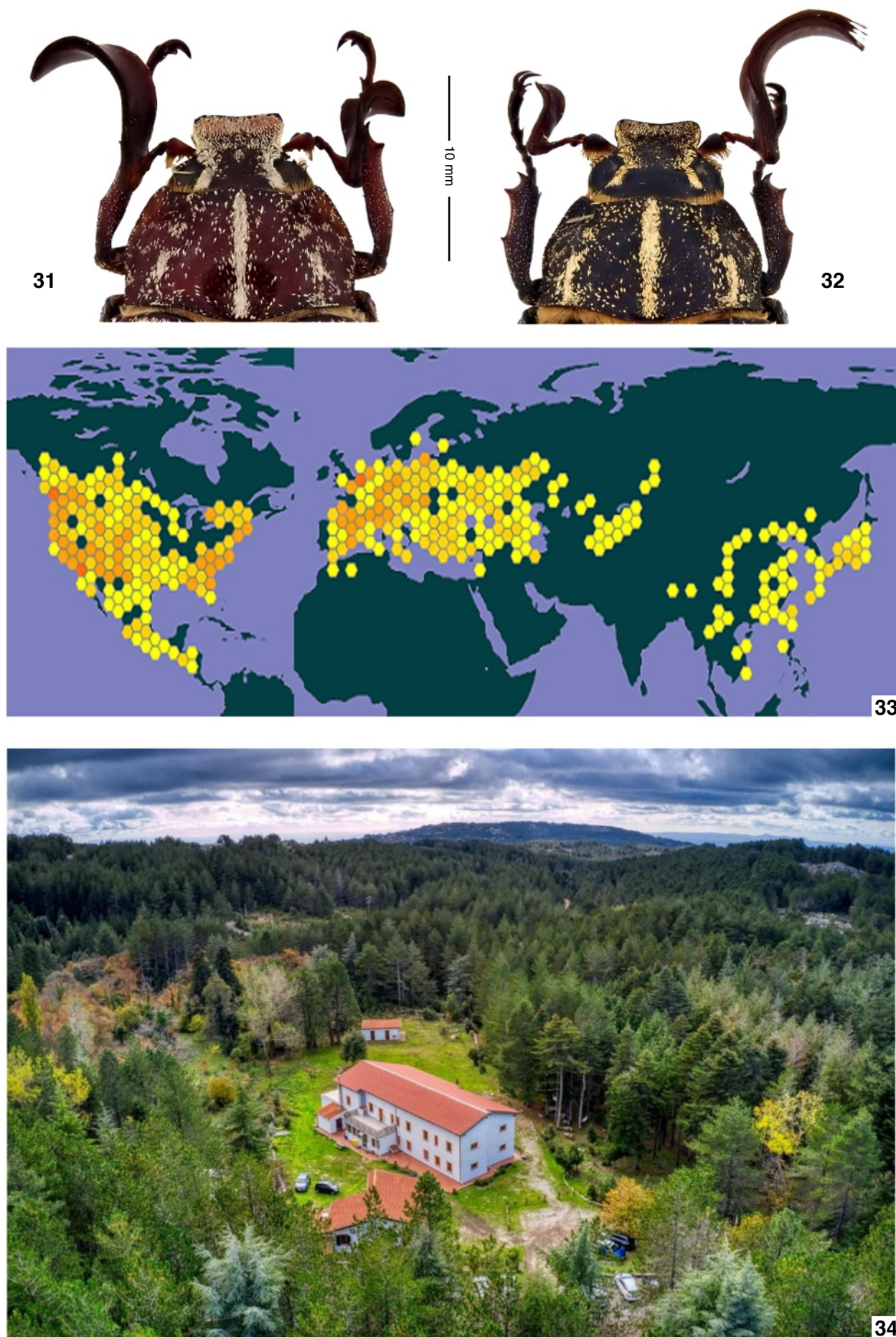


Fig. 31-32. Detail of the anomalous antennal asymmetry. **31.** *Polyphylla fullo* from Tunisia. **32.** *P. fullo* from Italy.
Fig. 33. Holarctic distribution of the genus *Polyphylla* (<https://www.inaturalist.org/taxa/84572-Polyphylla#map-tab> access January 2026).
Fig. 34. Habitat of *P. ichnusae* Sabatinelli, Nuvoli & Cillo n. sp. on Mount Limbara, North East Sardinia.



Fig. 35-52. Base of pronotum.

35. *Polyphylla olivieri* (Laporte, 1840). 36. *P. fullo* (Linnaeus, 1758). Lateral basal margin of elytra. 37. *P. boryi* (Brullé, 1832). 38. *P. albertschulzi* Kuntzen, 1933. Juxtasutural interstria. 39. *P. fullo*. 40. *P. ragusae* Kraatz, 1882. Pronotum vestiture. 41. *Polyphylla boryi*. 42. *P. olivieri*. Basal part of elytra. 43. *P. boryi*. 44. *P. albertschulzi*. 45. *P. ragusae ragusae*. 46. *P. ragusae aliquoi* Massa & Tassi, in Baraud 1977. 47. *P. naxiana* Reitter, 1902. 48. *P. turkmenoglui* Petrovitz, 1965 (Holotype). 49. *P. hassi* Hass & Reichenbach, 2014. 50. *P. fullo*. 51. *P. olivieri*. 52. *P. maroccana maroccana* Peyerimhoff, 1925.



Fig. 53-62. Right protibia. 53. *Polyphylla fullo* (Linnaeus, 1758). 54. *P. fullo*. 55. *P. ichnusae* Sabatinelli, Nuvoli & Cillo n. sp. (Holotype). 56. *P. turkmenoglui* Petrovitz, 1965 (Holotype). 57. *P. hassi* Hass & Reichenbach, 2014. 58. *P. maroccana maroccana* Peyerimhoff, 1925. 59. *P. sicardi* Bedel, 1917. 60. *P. ragusae ragusae* Kraatz, 1882. 61. *P. naxiana* Reitter, 1902. 62. *P. boryi* (Brullé, 1832).
 Fig. 63-65. Scales on the abdomen. 63. *P. albertschulzi* Kuntzen, 1933. 64. *P. boryi*. 65. *P. olivieri* (Laporte, 1840).
 Fig. 66-71. Clypeus. 66. *P. boryi*. 67. *P. fullo*. 68. *P. hassi*. 69. *P. olivieri*. 70. *P. turkmenoglui* (Holotype). 71. *P. ragusae ragusae*.

Key to Mediterranean *Polyphylla* (males)

1. Antennal club markedly longer than the pronotum and strongly curved outward (Fig. 3-12); elytral white scales spots nebulous or distinctly marbled (Fig. 43-51); body relatively large (28-43 mm) **4**
- Antennal club shorter than the pronotum and weakly curved or straight (Fig. 1-2); elytral white scales not forming large patches except along the inner margin of the humeral callus (Fig. 52); body relatively small (23-27 mm) **2**
2. Anterior tibiae generally tridentate (Fig. 59), (Morocco, Boulemane Province) **sicardi** Bedel
- Anterior tibiae generally bidentate (Fig. 58) **3**
3. Proximal part of epipleural margin flat or concavous, body larger, apex of paramera with dorsal carina short (Fig. 13), (Morocco: northern part of occidental Atlas and Sous Pro **maroccana maroccana** Peyerimhoff
- Proximal part of epipleural margin thick, body slimmer, apex of paramera with dorsal carina long (Fig. 14), (Algeria: Aïn Sefra) (Fig. 2) **maroccana descarpentriesi** de Wailly & Baraud
4. Juxtasutural interstria elevated, shiny, with a few isolated white scales (Fig. 39); elytral vestiture not uniform, marbled by patches of scales prevailing over a background of small scales; body rather shiny, brown to black **7**
- Juxtasutural interstria not elevated with fairly dense white squamules (Fig. 40); integument light brown; elytral vestiture nearly uniform, composed of white scales on a light-brown integument (Fig. 4-6) **5**
5. Anterior tibiae with the proximal tooth blunt as long as the apical (Fig. 61), a third smooth basal tooth also appreciable in some specimens, (Naxos, Greece) (Fig. 6) **naxiana** Reitter
- Anterior tibiae always with two teeth the proximal one sharp smaller than the apical (Fig. 60) **6**
6. Elytral scales evenly distributed (Fig. 45) (eastern and western Sicily) (Fig. 4) **ragusae ragusae** Kraatz
- Elytral in addition to evenly distributed scales with aggregated spots of scales (Fig. 46), (south-eastern Sicily) (Fig. 5) **ragusae aliquoi** Massa & Tassi in Baraud
7. Base of pronotum not margined (Fig. 36) **8**
- Base of pronotum margined to the median lobe (Fig. 35) **11**
8. Anterior angles of clypeus largely rounded (Fig. 66-67), elytra with large marbled pattern of white scales, very few scattered scales present out of the marbled pattern **9**
- Anterior angles of clypeus sharper (Fig. 68, 70), elytra with small aggregation of white scales on a background of dense isolated scales (Fig. 48-49) **10**
9. Integuments of elytra generally black, when brown also pronotum is brown, protibiae tridentate (Fig. 54), the incipient basal tooth always appreciable (Fig. 53); apex of paramera smoothly rounded in dorsal part (Fig. 24), (continental Europe, Corsica and North Africa from Morocco to Tunisia) (Fig. 11) **fullo** (Linnaeus)
- Integuments of elytra light brown pronotum black, protibiae bidentate (Fig. 55), apex of paramera massive angulated in dorsal part (Fig. 23), (Northeast Sardinia) (Fig. 10) **ichnusae** n. sp.
10. Elytral scalation forming nebulous patterns on a farinose background of scales (Fig. 48) (West Turkey) (Fig. 3) **turkmenoglui** Petrovitz
- Elytral scalation with less dense pattern of white scales (Fig. 49), (Rhodos, Samos and Kos) (Fig. 12) . . . **hassi** Hass & Reichenbach
11. Lateral longitudinal bands of white scales interrupted medially (Fig. 42); pronotum strongly convex; protibiae tridentate, with the incipient basal tooth always distinct, (Western Europe, Turkey, Near East) (Fig. 9) **olivieri** (Castelnau)
- Lateral longitudinal bands of white scales continuous (Fig. 41); pronotum not strongly convex; protibiae bidentate without trace of a basal tooth (Fig. 62) **12**
12. Elytral white scales forming irregular large spots amid scattered scales (Fig. 43); basal epipleura with scattered scales resembling those on the disc (Fig. 37), (Bulgaria, Croatia, Greece, Montenegro, Turkey) (Fig. 7) **boryi** (Brullé)
- Elytral white spots strongly reduced and uniform (Fig. 44); basal epipleural region with a compact band of white scales (Fig. 38) (Kriti) (Fig. 8) **albertschultzi** Kuntzen

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Contribution of the authors ¹

Publisher correspondence. – GS
Writing the article. – GS, MTN, DC
Description of the new species. – GS, DC
Article proofreading. – GS, DC
Bibliographic work. – GS, DC
Material study. – MTN, DC
Author of the figures. – GS

¹ GS = Guido Sabatinelli – MTN = Maria Tiziana Nuoli – DC = Davide Cillo.

Résumé

Sabatinelli G., Nuoli M. T. & Cillo D., 2026. – *Polyphylla ichnusae* (Coleoptera, Scarabaeidae, Melolonthini), nouvelle espèce pour la Sardaigne et notes sur les *Polyphylla* méditerranéens. *Faunitaxys*, 14(08) : 1 – 16.

Polyphylla ichnusae Sabatinelli, Nuoli & Cillo n. sp. taxon endémique de Sardaigne précédemment signalé comme *P. fullo* (Linnaeus, 1758), est réévalué à la lumière d'examen morpho-anatomiques. Les configurations du complexe de l'édéage et des paramères, du tibia antérieur et de la pigmentation des élytres (brun clairs, en contraste avec la couleur sombre de la tête et du pronotum), attestent d'un statut spécifique distinct, non congruent avec les populations corses et continentales de *P. fullo*. L'espèce apparaît strictement circonscrite au secteur nord-oriental de la Sardaigne (jusqu'à 1000 m), dans les formations végétales xérophiles à *Pinus* et *Quercus*. Dans le cadre de l'évaluation du statut des *Polyphylla* méditerranéens, nous soulignons également la nécessité de confirmer la synonymie présumée de *Polyphylla fullo algerana* Brenske, 1896 et *P. fullo macrocera* Reitter, 1891 avec *P. fullo* (Linnaeus, 1758). Un catalogue et une clé d'identification des mâles des espèces méditerranéennes de *Polyphylla* sont fournis, accompagnés d'illustrations de l'habitus, des paramères et des caractères diagnostiques utilisés dans la clé des différentes espèces.

Mots-clés. – Scarabaeidae, Melolonthini, biogéographie, nouvelle espèce, description, systématique, taxonomie, morphologie, endémique, Sardaigne

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SOMMAIRE

Polyphylla ichnusae, une nouvelle espèce de Sardaigne dans le contexte méditerranéen (Col. Scarabaeidae Melolonthinae Melolonthini).

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Polyphylla ichnusae new species from Sardinia with notes on Mediterranean *Polyphylla* (Col. Scarabaeidae Melolonthinae Melolonthini).

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Illustration de la couverture :

Polyphylla ichnusae Sabatinelli, Nuvoli & Cillo, 2026 **n. sp.** in Tempio Pausania (Limbara Mt., Sardinia, Italy).

Crédits:

Guido Sabatinelli : All figures in the text.

Marco Pisu : Couverture.